

MESSAGE FROM THE PRESIDENT

In the September 2001 *Wingspan*, President Mike Kochert expressed disbelief that his four years as President were coming to a close. Now it's my turn to express disbelief that my term as President has begun! I have big shoes to fill. Mike Kochert did an excellent job for RRF, and he leaves us an organization that is sound, both fiscally and professionally. We owe Mike a large debt of gratitude for his years of high-caliber service to the RRF family.

I'm excited about the prospects ahead for RRF, and honored to have a chance to help shape that future. For those of you who don't know me, I'm a long-time RRF member, having joined in 1972, and served as a director since 1994. I started my career with birds of prey in the early 1970's, first as a falconer and later banding hawks at Cape May and studying Barn Owls in northern Virginia. I have a B.S. in Wildlife Biology from Colorado State University and a M.S. in Evolutionary and Systematics Biology from George Mason University, where I completed a thesis on biogeography and systematics of the Gray Hawk. I've worked professionally as a wildlife biologist for the U.S. Bureau of Land Management in Wyoming and Arizona, as a raptor biologist for the National Wildlife Federation in Washington D.C., and as a regional nongame wildlife biologist and (currently) Chief of the Bureau of Wildlife Diversity Conservation for the Florida Fish and Wildlife Conservation Commission. Although my current job is primarily administrative, I do serve as principal investigator for research projects looking at survival of Bald Eagles, foraging ecology of Cooper's Hawks, and population viability of urban Burrowing Owls. I remain an active falconer, and have served as both Vice President and President of the North American Falconers Association.

Raptors evoke strong emotions in all of us. RRF certainly derives much of its organizational energy from this emotional charge. But to me, RRF's greatest achievement is that we have managed to channel this emotional enthusiasm in a scientifically credible and scholarly fashion. My goal as President will be to continue this convention. Certainly one key to this will be to maintain the high standards we have set for *The Journal of Raptor Research* and Raptor Research Reports. While this might seem the exclusive job of our editorial staff, that is only partly true. The caliber and quality of our publications actually rest more in our hands, because we determine which papers are submitted to RRF publications. It is the caliber of this raw material that matters most in the end, so please keep this in mind when you consider outlets for your work. A second area of emphasis for me will be RRF's role as a responsible voice for raptor conservation. As an agency biologist, I know how important it can be for non-governmental organizations to weigh in on emotional issues with carefully considered and balanced positions. Those organizations that do so are highly valued,



and their opinions are actively sought. RRF has done a remarkably effective job in this regard in recent years, and I will be striving to ensure we stay on this track so that our stance on issues carries increasing weight and importance. A third area of emphasis for me will be to continue to expand RRF's presence internationally and in other circles where raptors are the focus of interest. RRF has made great progress with its Eurasian Committee toward establishing a model for global organization. We need to complete implementation of this model, and if all continues to go well, we need to consider where else the approach might apply. Finally, I'm not ashamed to admit that I still find raptors darn neat to be around, and I intend to do my part to see that we celebrate the less academic aspects of our passion at our annual meetings. We deserve to have fun once in awhile, don't we?

As I stated at the outset, I'm excited about the prospects for RRF's future, and honored to have this chance to contribute. To be effective, though, I need your input, advice, and ideas. Please be free with all of the above.

Brian

RAPTOR RESEARCH FOUNDATION 2001 ANNUAL MEETING

Winnipeg, Manitoba, Canada

by Carl D. Marti

Manitoba Conservation played host to the Raptor Research Foundation, Inc. for the 2001 Annual Meeting, 24-28 October. The Local Committee, chaired by Jim Duncan, arranged an interesting and stimulating meeting in downtown Winnipeg, Manitoba. Other meeting supporters were Manitoba Hydro, Environment Canada, Manitoba Special Conservation Fund, Winnipeg Foundation, Owl Symposium Fund, Peregrine Falcon Recovery Project (Manitoba), C. Stuart and Mary Houston, Falconbridge Limited, Gray Owl Fund, and Manitoba Park Council. The approximately 125 attendees were made to feel welcome by the friendly people of Canada's most diverse city. About 55 papers were presented in the general sessions, a North American Shrike Symposium, and a North American Raptor Monitoring Strategy Workshop. Outstanding music provided by the Celtic group Ten Bones, Japanese drummers Subuki Daiko, and a string quartet highlighted the evening social events. Field trips took participants through a boreal forest, the Oak Hammock Marsh Wildlife Management Area, and the world famous Delta Marsh. The 2001 meeting will be remembered as well organized, smooth running, and intimate thanks to the Local Committee, Dan Chranowski, Ken De Smet, Jim Duncan, Darcy Falk, Chris Higgs, Bob Jones, Bill Koonz, Tracy Maconachie, Kurt Mazur, Bob Nero, Judy Norton, and Chris Penner. Jeff Smith, the Scientific Committee Chairperson, organized the scientific sessions in his usual professional manner.

FIRST HARPY EAGLE HATCHED IN CAPTIVITY IN PANAMA

The first Harpy Eagle bred from captive parents in Panama hatched Thursday, 24 January 2002 at 1:30 AM in the Neotropical Raptor Center of Fondo Peregrino - Panamá (The Peregrine Fund - Panama). The chick is the first individual of this impressive Panamanian national bird to hatch in captivity in Central America. Breeding this powerful raptor species in captivity is a feat that has been achieved only a few times in North America at the World Center for Birds of Prey in Boise, Idaho and at the San Diego Zoo. The breeding program in Panama has had an exceptional start. "The adult birds arrived in Panama only four months ago so we are very pleased to have the first chick," explained Mr. Jacobo Lacs, representative of the Board of Directors for Fondo Peregrino - Panamá and The Peregrine Fund.

The eaglet, of unknown sex, is being cared for temporarily in a brooder under controlled climatic conditions. "This is a very exciting moment for wildlife conservation in Panamá," commented Eng. Ricardo Anguizola, General Administrator of the National Environmental Authority of Panama (ANAM). "It is the first step toward restoration of the wild population of our national bird. Congratulations to Fondo Peregrino - Panamá and to its scientific staff for this first Harpy Eagle chick," he added. Once the newly hatched chick learns how to hunt, it will be released into the wild in Panama as part of the Harpy Eagle conservation and research program that is conducted by Fondo Peregrino - Panamá. "The captive breeding of Harpy Eagles for reintroduction in wild areas where they have disappeared is one of the highest priorities of Fondo Peregrino - Panamá," concluded Mr. Lacs. Fondo Peregrino's Harpy Eagle program is sponsored by the National Environmental Authority of Panama, the Panama Canal Authority (ACP), the Ecological Police, the City of Knowledge Foundation, and the United States Agency for International Development (USAID).

THE RAPTOR RESEARCH FOUNDATION, INC.

(FOUNDED 1966)

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Wingspan is distributed twice a year to all RRF members. It is also available to non-members for a subscription rate of \$10 per year. *The Journal of Raptor Research* (ISSN 0892-1016) is published quarterly and available to individuals for \$33 per year (\$18 per year for students) and to libraries and institutions for \$50 per year from: Ornithological Societies of North America, P.O. Box 1897, Lawrence, KS 66044 USA. Add \$5 for destinations outside of the continental United States. Individual and student memberships renewed before November 15 are \$30 and \$15, respectively. Persons interested in predatory birds are invited to join The Raptor Research Foundation, Inc. Send requests for information concerning membership, subscriptions, special publications, or change of address to: Ornithological Societies of North America, P.O. Box 1897, Lawrence, KS 66044 USA.

NEWS FROM THE AVIAN SCIENCE AND CONSERVATION CENTRE OF MCGILL UNIVERSITY

by David M. Bird

The overall aim of the Avian Science and Conservation Centre of McGill University based in Montreal, Quebec, Canada is to promote the study of birds and their conservation. To achieve this aim, the centre's mandates are: 1) to conduct pure and applied research in field and laboratory, 2) to conserve endangered species through captive breeding and management of wild populations, and 3) to train undergraduate and graduate students, as well as interns from all over the world. A strong emphasis is placed on raptorial birds due to the research interests of the centre's director. Here is a synopsis of some of the latest research involving these birds.

Screech Owls Versus Chemicals in Quebec Apple Orchards

Ngaio Richards, an M.Sc. student co-supervised by Dr. Bird and Dr. Pierre Mineau of the Canadian Wildlife Service (CWS), spent almost every night in 2001 studying the elusive Eastern Screech-owl in the apple orchards of Quebec's Mont Saint Hilaire and Rougemont region. These small owls are not always easy to find in the dead of night, so Ngaio has put up dozens of wooden nestboxes to induce the birds to use them for nesting and roosting. This makes it easier for her to find the regurgitated pellets of undigested materials like bones, feathers, fur and insect parts, so that she can examine them by day in the laboratory to ascertain the owls' diet. Also during the daylight hours, Ngaio has been busy analyzing tissues of collected rodents and blood samples from the owls to determine their levels of organochlorines, organophosphates and anticoagulants, chemicals that some orchard farmers heavily rely on.

Loggerhead Shrikes Experimentally Released into the Wild!

Efforts by the Canadian Wildlife Service and many others (including the ASCC!) to save the eastern subspecies of the Loggerhead Shrike took a giant leap forward in the summer of 2001 when a small number of fledged young were released experimentally into the wild. Special release cages were built and installed in three locations right in the heart of excellent shrike habitat on privately owned land in Ontario. The idea was to induce captive-bred pairs to produce youngsters which would be "trained" to catch live prey and then slowly released into the wild; the parents were returned to the breeding facilities at the Toronto Zoo and the ASCC.

Are City Environments Hazardous for Peregrine Falcons?

Few things are certain in life, but in Montreal there would appear to be two. First, the Peregrine Falcons will indeed return to nest on the 32nd floor of Place Victoria, and second, they will not produce more than one youngster! ASCC staff have no idea why the latter is so, except to speculate that maybe the female or male has some kind of reproductive disability, e.g. an ovarian infection or low sperm count, respectively. Marcel Gahbauer, an ASCC graduate student, is using satellites to track the migratory movements of city-dwelling vs. cliff-dwelling peregrines in a collaborative study with the Canadian Peregrine Foundation based in Toronto (www.peregrine-foundation.ca). The main thrust of Marcel's thesis research is to find out whether cities, with all their hazards including treacherous wind shears, mirror-sided buildings, traffic, etc., are good or bad for peregrines.

Other News of Graduate Students from the ASCC

Four graduate students working on raptors should be receiving their M.Sc. degrees in 2002! The following students await their final approvals on their M.Sc. theses. Marc Pauze, jointly supervised by Drs. Bird and Titman, evaluated the impact of nesting Red-tailed Hawks and Great Horned Owls on duck populations in prairie habitat enhanced by the Institute for Wetland and Waterfowl Research operated by Ducks Unlimited. Alain Fontaine studied habitat use by the red-tails as part of the study above under the joint supervision of Drs. Titman and Bird and is working on his final draft while employed by the CWS. Joanna Coleman, supervised by Dr. Bird with the assistance of Dr. Laird Shutt of the CWS and Eugene Jacobs of Wisconsin, examined habitat selection as well as the impacts of organochlorine chemicals on urban-nesting Sharp-shinned Hawks in the Montreal area and awaits final approval of her thesis. Oliver Love, supervised by Drs. Bird and Shutt, handed in for approval his M.Sc. thesis on the adrenocortical response of nestling American Kestrels.

Those wishing to learn more about the Avian Science and Conservation Centre, including its summer student internship program, are invited to visit its web site at www.nrs.mcgill.ca/ascc.

FIRST ANNOUNCEMENT

INTERNATIONAL CONFERENCE ON NEOTROPICAL RAPTORS AND HARPY EAGLE SYMPOSIUM

The Peregrine Fund • Fondo Peregrino - Panamá

**Panama City, Panama
24 - 27 October 2002**

The Peregrine Fund and Fondo Peregrino - Panamá invite you to join scientists, conservationists, resource managers, falconers, representatives of zoos, government and non-governmental organizations, and other persons and institutions with an interest in research and/or conservation of birds of prey in Latin America and the Caribbean to participate in a meeting to share knowledge, interests, and concerns and help develop a network of practitioners in the fields of raptor conservation, research, captive-breeding, and falconry.

Details and registration forms are available on The Peregrine Fund's web-site at: <http://www.peregrinefund.org/nrconference.html>. Or, contact: Neotropical Raptor Conference, The Peregrine Fund, 5668 Flying Hawk Lane W, Boise, ID 83709 USA; phone: 1-208-362-3717; fax: 1-208-362-2376; e-mail: tpf@peregrinefund.org.

ANNOUNCEMENTS

UPCOMING MEETINGS

2002

September 24-28

**RAPTOR RESEARCH FOUNDATION (3rd
NORTH AMERICAN ORNITHOLOGICAL
CONFERENCE)**

New Orleans, Louisiana

Contact: <http://www.tulane.edu/~naoc-02> or
UNO Conference Services - NAOC 2002,
Metropolitan College, New Orleans, LA 70148-
9999, phone: 1-800-258-8830, fax: 1-504-280-
7317, e-mail: confmc@uno.edu

October 24-27

**INTERNATIONAL CONFERENCE ON
NEOTROPICAL RAPTOR AND HARPY
EAGLE SYMPOSIUM**

Panama City, Panama

Contact: [http://www.peregrinefund.org/nrcon
ference.html](http://www.peregrinefund.org/nrconference.html) or Neotropical Raptor Conference,
The Peregrine Fund, 5668 Flying Hawk Lane W,
Boise, ID 83709 USA, phone: 1-208-362-3717,
fax: 1-208-362-2376, e-mail: tpf@peregrinefund.org

2003

September

**RAPTOR RESEARCH FOUNDATION
Fairbanks, Alaska**

POSITIONS AVAILABLE

**APLOMADO FALCON RELEASE SITE
ATTENDANTS** The Peregrine Fund is recruiting
temporary site attendants for its Aplomado Falcon
release sites near the Gulf Coast in south and west
Texas. The success of the Aplomado Falcon
recovery effort depends greatly on the efforts of
the site attendants. Only serious, highly motivated
individuals need apply. Applicants receiving

positions will participate in a unique effort to
restore endangered Aplomado Falcons to their
native habitat. Working as part of a two-person
team, attendants will be responsible for feeding
and monitoring from 6 to 15 young falcons from
the time they are placed at the site until they reach
independence. Following a monitoring and
reporting format provided by The Peregrine Fund,
attendants will be required to submit a report upon
completion of the project. The success of the
study and release effort will depend on the effort
of the individual as well as the team. The start
date for these positions depends on when the
falcons hatch and fledge at The Peregrine Fund's
facility in Boise, Idaho. Based on our experience,
we expect the positions to begin as early as May
and as late as August. Some sites will require
monitoring into September. Generally, positions
last until the falcons gain independence from the
hack site. This is normally between 8 and 12
weeks. Some ornithological and/or other wildlife
experience is desirable but not mandatory.
Applicants must be in good physical condition and
able to work outdoors in a hot and humid
environment. Applicants must be 18 years or
older. As a temporary employee, hack site
attendants will receive a check every two weeks
for \$548. Housing will be provided. Attendants
are responsible for their own food and
transportation to and from the site. It will be
necessary for at least one member of the team to
have a vehicle. The Peregrine Fund will supply
each site with a spotting scope and tripod, which
must be returned to the Fund at the completion of
the study. Applicants not residing in the United
States will need to obtain a Green Card and U.S.
Social Security Card. Hack site attendants are
required to work long, hard hours. The short
period in which the study can be completed and
the remote locations of the hack sites preclude
"time off." No pets will be allowed. Please
request an application, as soon as possible, by
contacting The Peregrine Fund at the address
listed below. If you are e-mailing your request,
please include your full mailing address.
Applications and resumes, if available, need to be

completed and returned by 30 March 2002 or sooner. Applicants receiving temporary positions will be notified by 15 April or sooner. Applications will be accepted until 15 June 2002; however, these will only be considered if positions remain unfilled. **William R. Heinrich--Species Restoration Manager; The Peregrine Fund, Inc.; 5668 Flying Hawk Lane W; Boise, ID 83709; phone: 1-208-362-3716; e-mail: tpf@peregrinefund.org**

CALIFORNIA CONDOR FIELD ASSISTANTS (Temporary and Full-Time) The Peregrine Fund is recruiting two full-time and two six-month temporary field assistants to work at our California Condor release site in northern Arizona. Recruitment for these positions is staged, with the first position beginning on 20 February 2002 and others following in March, April, and June 2002. For background information on the California Condor program, interested candidates should visit the "Notes from the Field" section of The Peregrine Fund's website (<http://www.peregrinefund.org/notes.html>). The success of the California Condor release effort depends greatly on the dedication of our field biologists; only serious, highly motivated individuals need apply. As a member of a six-person team, the duties of the field assistant include monitoring the movements of free-flying condors using radio transmitters and taking detailed behavioral notes. The job requires long, sometimes strenuous days in the field. Applicants must be able to carry heavy supplemental condor food, sometimes in the dark over rough terrain. Interacting and sharing information on these charismatic birds with our cooperators and the general public is an important part of the job. Field assistants are responsible for the management of project equipment, including vehicles, radios, and optical and computer equipment. This is not a desk job. Applicants must be highly energetic and willing to work extremely long days while maintaining a positive attitude. Successful field assistants must be able to tolerate climate extremes, be in excellent physical condition, and be prepared to work independently in remote areas. Individuals must possess a biology-related undergraduate or graduate degree; they should also be confident

driving standard 4WD trucks over remote back roads. Previous experience using telemetry, GPS units, and making behavioral observations and notes is highly desired. Full-time positions start at \$16,015 per year. Six-month temporary positions start at \$7,122 for the six months. Salary is paid every two weeks, and housing is provided. Expect to work in one of the most beautiful areas in the southwestern United States, including Grand Canyon National Park, Vermilion Cliffs, and the surrounding areas. The climate can vary from extremely hot in the summer months to brutally cold during parts of the winter. Based out of The Peregrine Fund's central office near Marble Canyon, Arizona, field assistants will spend some days working in isolation, monitoring birds from blinds and living in a tent for days at a time. Other days will be spent in the Grand Canyon National Park, talking to as many as 100 people per day on the biology of the California Condor and efforts to restore it to the American Southwest. Please request an application as soon as possible, by contacting The Peregrine Fund at the address listed below. If you are e-mailing your request, please include your full mailing address. When returning your application, please include a resume and two letters of reference, if possible. Please remember the first position opens 20 February, with two more on 1 March, followed by positions beginning in April and June. **William R. Heinrich--Species Restoration Manager; The Peregrine Fund, Inc.; 5668 Flying Hawk Lane W; Boise, ID 83709; phone: 1-208-362-3716; e-mail: tpf@peregrinefund.org**

FIELD BIOLOGIST AND VOLUNTEER needed for a long-term Northern Goshawk monitoring project on the Targhee National Forest in eastern Idaho, starting in late March through early August. Conduct surveys during the nesting season to determine occupancy and productivity at historic nesting territories, and assist in trapping and radio-tagging adults. Requires excellent identification skills, ability to navigate through mountain forests, some experience in handling raptors, hiking in rugged terrain, and use of snow machines and skis or snowshoes. Housing and vehicle provided. Salary \$1100/month or \$15/day

for volunteer. Some flexibility possible in start and end dates (or working only spring or summer season). Send a resume and 3 references to: **Susan Patla, Northern Rockies Conservation Cooperative, P.O. Box 505, Driggs, ID 83422, e-mail: spatla@tetonvalley.net**

ON-LINE RESOURCES

VULTURE WORKSHOP REPORTS Reports from the workshop on declines in *Gyps* vulture populations--which was held at RRF's 4th Eurasian Conference in Sevilla, Spain, September 2001--are available on the National Birds of Prey Centre's website: <http://www.nbpc.co.uk/ivr2001.htm>. A summary of open discussion that followed the last presentation is also provided.

NEWS OF MEMBERS

Cole Crocker-Bedford has moved from the Tongass National Forest in Alaska to take the position of Chief of Natural Resources for the Grand Canyon National Park, Grand Canyon, AZ 86023-0129 (phone: 928-638-7750).

REQUESTS FOR ASSISTANCE

WANTED: old (early-80's vintage) RRF Logo Pin showing the banking Prairie Falcon (no lettering). Contact **Karen Steenhof, ksteenho@eagle.boisestate.edu**

RECENT THESES ON RAPTORS

The U.S. Geological Survey's Richard R. Olendorff Memorial Library would greatly appreciate receiving a copy of each thesis or dissertation abstracted in *Wingspan*. This allows the Library to make theses available to scientists and managers worldwide through its Raptor Information System (RIS, see *Wingspan* 7(1):16). Please send theses to: Olendorff Memorial Library, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Snake River Field Station, 970 Lusk Street, Boise, ID 83706.

Amar, A. 2001. DETERMINING THE CAUSE OF THE HEN HARRIER DECLINE ON ORKNEY. Ph.D. Thesis, Univ. Aberdeen, Scotland. 114pp.

The decline of the hen harrier (*Circus cyaneus*) population on the Orkney Islands, Scotland, began around the start of the 1980s. The number of adults in the population has declined and so has the breeding success of males. This lower breeding success was due to a decrease in the amount of polygyny, an increase in the failure rate of secondary females and an increase in the number of males which failed to breed at all. I tested the hypothesis that the decline of this population was due to a decrease in food supply during the pre-lay and incubation period. Data on provisioning rates in Orkney supported this hypothesis. Male harriers in Orkney provisioned their females with food at a far lower rate, during both the pre-lay and incubation period, than males from another population with a higher breeding performance. Within Orkney, the likelihood of a male having a breeding female was positively associated with the rate at which he supplied food. The hatching success of incubating females was also positively associated with the rate at which they received food.

A supplementary feeding experiment showed that male breeding was limited by food supply during the early stages of breeding. Males provided with extra food had more breeding females than controls, which resulted from the combination of an increase in polygyny and a decrease in the number of non-breeding males. The sex ratio of the adult population was very similar to that found during the late 1970s when polygyny levels peaked. Thus, correlative and experimental data suggests that polygyny in this population is most heavily influenced by food, rather than by skewed sex ratios.

I also examined the evidence for an additional hypothesis that the decline in the population was due to an increase in predation. Hooded crows are the main egg predator of hen harriers in Orkney and although there was evidence to suggest that their numbers may have increased, experimental removal of crows had no detectable effect on harrier breeding success.

The strongest evidence therefore, was that the decline in the population had been caused by a decrease in the amount of food that males were able to supply to their females in spring. During the spring, the amount of time males spent hunting in an area was positively associated with the amount of unmanaged rough grass. This preference for areas with unmanaged grass was most likely attributable to the positive relationships that existed between this habitat variable and many of the important prey species in spring. Decreases in the amount of land used for rough grazing and an increase in the amount of land under pasture has probably decreased this habitat variable. Additionally, a doubling in the sheep density in Orkney over the last 20 years may have also decreased the amount of unmanaged grass.

Predicting the future of this population using demographic stochastic models suggested that if it were a closed population, then extinction of the breeding population might occur within the next 10-15 years. However, the evidence suggests that it is not an isolated population and that there may be more immigration than emigration. The lack of data on this aspect, however, makes it difficult to predict with any accuracy the future rate of the decline. Management for this population should focus on increasing the abundance of food supplies for the males in the spring. Creation of areas with large amounts of unmanaged rough grass would appear to be the best way of achieving the objective and could potentially reverse the decline of this population.

Linkhart, B. D. 2001. LIFE HISTORY CHARACTERISTICS AND HABITAT QUALITY OF FLAMMULATED OWLS (*OTUS FLAMMEOLUS*) IN COLORADO. Ph.D. Diss., Univ. Colorado, Boulder. 206pp.

I determined the life history characteristics and the components of habitat quality in a Colorado population of Flammulated Owls (*Otus flammeolus*) in a 19-yr study. The owl is a small, monogamous Neotropical migrant that nests in mature conifer forests in western North America, and is considered sensitive by the USDA Forest Service. Conservation planning is limited by lack of data regarding the owl's population dynamics and habitat requirements. I assessed population dynamics based on density, territory fidelity, dispersal, survival, and reproduction of the owls. Most owl territories were constant in time and space despite turnover of individuals. Density of breeding pairs showed little annual variation. Up to 70% of territories were occupied annually by bachelor males, suggesting that females have lower survival. Compared to other North American owls, Flammulated Owls have a small and unvarying clutch size, high nesting success, and a long breeding lifespan, indicating they have a life history similar to larger owls.

Territory fidelity was male-biased, as it is with most birds, and pairs rarely divorced. Most breeding dispersals were by females that moved one or two territories away from their original territories. However, females whose nests failed the previous year had lower return rates to the study area than females whose previous nests were successful. Dispersal distance may be bimodal with females dispersing longer distances after nesting failure and shorter distances after successful nests. Females dispersed to territories where total productivity during the study was higher than on original territories, suggesting they

assessed territory quality before dispersing.

Characteristics of high-quality breeding habitats were determined by correlating long-term demographic parameters of owls with habitat characteristics on their territories. Territories differed significantly in total years they were occupied by breeding pairs and in total productivity. Availability of cavity-trees for nesting determined where owls established territories, while forest type and structure determined whether a territory was more often occupied by breeding pairs or bachelor males. High-quality breeding habitat for Flammulated Owls was characterized as mature, open stands of ponderosa pine (*Pinus ponderosa*) mixed with Douglas-fir (*Pseudotsuga menziesii*) with sufficient cavity-trees for nesting.

Ward, J. P., Jr. 2001. ECOLOGICAL RESPONSES BY MEXICAN SPOTTED OWLS TO ENVIRONMENTAL VARIATION IN THE SACRAMENTO MOUNTAINS, NEW MEXICO. Ph.D. Diss., Colorado State Univ., Fort Collins. 422pp.

I evaluated the hypothesis that Mexican Spotted Owls (*Strix occidentalis lucida*) could be conserved by manipulating microhabitat conditions that increased abundance of one or more of its common prey species. I evaluated this hypothesis by (1) determining which common prey were preferred by this owl, (2) which prey species were most likely to influence the owl's reproduction, and by assessing (3) which prey species were most likely to increase in abundance following microhabitat manipulation while accounting for climate and habitat effects. I focused on one population of Mexican Spotted Owls over a 6-year period (1991-1996) in the Sacramento Mountains, New Mexico, where vegetation communities have changed considerably during the past 100 years.

I found that Mexican Spotted Owls preferred Mexican woodrats (*Neotoma mexicana*) but consumed greater numbers of white-footed mice (*Peromyscus* spp.) and voles (*Microtus* spp.) when abundant. Average number of young produced per pair was comparable to other spotted owl populations but reproduction was more variable over time. The owl's reproductive output covaried with total biomass of mice and voles. Biomass of Mexican woodrats contributed little to the correlation.

Abundance of Mexican woodrats per unit area was consistently low in all habitats during the study but slightly more abundant in late-seral mixed-conifer forest. I estimated that vast reduction of this seral stage could have decreased woodrat biomass by an average of 22 kg, for an overall net loss of 13 kg of common prey biomass per owl foraging range. I also found that shrub diversity and volume of large (≥ 30 -cm diameter) logs, both which were correlated with the abundance of Mexican woodrats, were less abundant in mid-seral stages of mixed-conifer forest. Thus, succession following past timber harvest may have contributed to greater variation in the owl's reproduction by diminishing habitat quality for its preferred prey while fostering more temporally dynamic populations of alternative prey.

Overall, the hypothesis was supported. Forest-thinning experiments designed to enhance microhabitat conditions for Mexican woodrats, and in turn reduce temporal variation in reproduction of Mexican Spotted Owls, should be conducted to evaluate the hypothesis further.

(Editor's note: Dr. Ward's dissertation may be viewed at <http://rydberg.biology.colostate.edu/research/pward/>)

Wightman, C. S. 2001. PATTERNS ASSOCIATED WITH HABITAT SELECTION BY PEREGRINE FALCONS IN CENTRAL WEST GREENLAND. M.S. Thesis, Boise State Univ., Boise, Idaho. 113pp.

Identifying patterns and features associated with selected habitats can indicate which combinations of resources are most suitable to animals. Animals, however, may select habitats as suitable even if resources in those habitats do not provide measurable fitness benefits. It is therefore necessary to evaluate

the fitness benefits associated with selected habitats to identify features that are important in the quality of a habitat. In an increasing population, the patterns with which animals occupy habitats also provide information on their behavioral strategies associated with habitat selection. Members of the Greenland Peregrine Falcon Survey collected occupancy and productivity data on an expanding population of peregrine falcons (*Falco peregrinus*) in central West Greenland between 1972 and 2000. Using these 28 years of data, I analyzed patterns of peregrine falcon occupancy and distribution among breeding sites, and evaluated whether productivity was associated with those patterns.

To identify characteristics associated with selected breeding sites, I measured 29 habitat features at 67 occupied and 38 unused breeding sites in summer 1998 and 1999. For each occupied site, I found that the nearest neighbor was significantly farther than the nearest cliff and the nearest historically occupied cliff. Although some unused cliff sites may be unavailable in a given year because of peregrine falcon spacing requirements, physical characteristics may make these cliffs unsuitable regardless of their availability. I used logistic regression to identify those features that are useful for predicting occupancy by peregrine falcons. Peregrine falcons chose cliff sites with eyrie ledges that provided some vertical overhang protection and were inaccessible to ground predators. They also chose ledges with a sand or dirt substrate rather than an available common raven (*Corvus corax*) stick nest. The apparent avoidance of stick nests may result from selection for moderate rather than complete overhang protection, the latter being characteristic of common raven stick nests in the study area. Peregrine falcons also occupied breeding sites with tall cliffs and open views.

To evaluate patterns of distribution and selection among occupied nest sites, I used occupancy and productivity data from 1972-1999. Variance in productivity was significantly lower at traditionally ($n=29$) rather than recently ($n=37$) occupied cliff sites, which suggests that traditionally occupied cliff sites are better quality. This also indicated that peregrine falcons occupy breeding sites according to a pattern of despotic distribution (resource defense) rather than an ideal free distribution (resource exploitation). Consistently occupied cliff sites ($n=40$) provided higher average productivity than inconsistently occupied cliff sites ($n=18$), and thus, these sites are also better quality. Using the habitat features measured at occupied cliff sites, I created two logistic regression models to predict traditional and consistent occupancy at cliff sites. Features of good quality habitat included the height or elevation gain of the cliff and protection from weather on the eyrie ledge. Spacing of suitable and occupied cliff sites also was an important feature, and the best cliffs generally were more isolated. I suggest this association with isolation results from the benefits of decreased intra-specific competition from neighbors and floaters. The similarity between features associated with suitable and good quality breeding sites suggests that unused sites are unsuitable because they provide poor reproductive benefits to the occupants.

To assist managers in recognizing suitable and good quality breeding habitat for peregrine falcons in Greenland, I developed three easily implemented models. Using logistic regression, I created a management model for predicting occupancy, and thus suitability, of cliff sites for peregrine falcons. Features in this model included cliff height and elevation of hill across the valley. I reserved a set of habitat features measured in 1999 and 2000 from occupied ($n=9$) and unused ($n=11$) cliff sites to evaluate the accuracy of the management model. The model correctly predicted occupancy at 75% of the validation cliff sites, which indicates this model is useful for estimating the number of suitable cliff sites in central West Greenland. I also used logistic regression to create two management models using habitat features of traditionally and recently occupied cliff sites to predict traditional occupancy by peregrine falcons, and thus better quality cliff sites. Habitat features included in one model were cliff height, ledge depth, and horizontal exposure of the eyrie ledge. The second model included cliff height, distance to nearest historically occupied cliff, and distance to nearest neighbor. Classification of cliff sites using these models, in conjunction with local sampling, can function as an index to the peregrine falcon nesting population size and stability throughout central West Greenland.

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Wingspan welcomes contributions from RRF members and others interested in raptor biology and management. Articles and announcements should be sent, faxed, or e-mailed to the editor: Leonard Young, 1640 Oriole Lane NW, Olympia, WA 98502-4342 USA (phone/fax: 360-943-7394, e-mail: wingspan@attbi.com). The deadline for the next issue is August 7, 2002.

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